

II. BACKGROUND

A. ATLAS

State Population: 1995 - 996,325
2000 - 1,002,648 (1990 census estimate)

State Surface Area: Land Only - 1,058 Mi.²
Total Area* - 1,214 Mi.²
(*Including Inland Waters; Excluding Estuarine Areas)

Number of Major Watersheds: 10
Number of 8 digit HUCs: 5

Total Stream/River/ Miles: 1,383 Miles
(1:24,000 RIGIS)

Lakes/Ponds Total Acreage : 21,796 Acres
(1:24,000 RIGIS)

WETLAND TYPE	AREA (acres)
Riverine Nontidal Open Water	1832
Lacustrine Open Water	17,518
Palustrine Open Water	4481
Palustrine Emergent Wetland: Marsh/Wet Meadow	4341
Palustrine Emergent Wetland: Emergent Fen or Bog	229
Palustrine Scrub-Shrub Wetland: Shrub Swamp	9606
Palustrine Scrub-Shrub Wetland: Shrub Fen or Bog	2060
Palustrine Forested Wetland: Deciduous	60,694
Palustrine Forested Wetland: Coniferous	10,900
Palustrine Forested Wetland: Dead	225
Riverine Tidal Open Water	7.4
Estuarine Open Water	8175
Estuarine Emergent Wetland	4014
Estuarine Scrub-Shrub Wetland	93
Marine/Estuarine Rocky Shore	671
Marine/Estuarine Unconsolidated Shore	2874
TOTAL AREA	
127,721 acres	

Area of Estuarine Waters: 151 square miles

Coastal Shoreline Miles: 78.62 miles

B. WATER POLLUTION CONTROL PROGRAM

1. Watershed Approach

In the Fall of 1997, DEM's Office of Water Resources initiated action on developing a Statewide Watershed Approach (SWA), securing federal funding to assist in the development process. Though DEM helped initiate the development of Rhode Island's Watershed Approach, it is much more than a DEM endeavor, involving non-profit organizations, universities, the private sector, and state, federal and local government in a collaborative process. Drawing from the membership of an existing stakeholders group, the Partners for Resource Protection (PRP), a small group began developing a draft SWA Framework. Using this framework, agency and organization directors were asked to be part of a SWA Coordinating Council. This Council would direct resources to identified local watershed needs, provide a mechanism to foster better coordination and joint planning, and provide guidance on the operation of the SWA as it is implemented.

The Council membership includes representatives of RIDEM, RIDOT, RI Statewide Planning Program, Save The Bay, RIDOH, USGS, Audubon Society of R.I., RIDOA, EPA, the Narragansett Bay Commission, Brown University, and the University of R.I.; the membership will likely evolve as other entities see a need to participate. It has been proposed that the PRP serve as a body that communicates the local watershed issues to the Coordinating Council, develops recommendations for action, offers technical assistance on a variety of issues to local watersheds, and provides a forum for discussion of statewide natural resource issues.

The Rhode Island Watershed Approach is a creative management strategy which emphasizes community-based planning and implementation. The intent is to assist and empower communities to more effectively preserve, protect, and restore Rhode Island's natural resources. The Watershed Approach provides a flexible framework for mobilizing the interests, concerns, and creative energy of everyone who lives, works, and plays in the watershed to address community-based management objectives. One of the key strengths is that it gives citizens and local organizations a real voice in managing public resources; this community involvement fosters solutions that make sense locally. The success of a watershed approach depends on making it possible for people to better understand the problems in their watershed, identify issues, set goals and priorities, and choose and implement solutions. This approach also reflects the reality that state and federal agencies cannot protect and restore watersheds on their own; nor do these agencies have a monopoly on resources and solutions.

Another reason for adopting this new approach is the nature of non-point source pollution in our watersheds. Traditional regulatory controls have excelled at addressing "end of the pipe" pollution sources, such as industrial and wastewater treatment plant discharges. Solutions to the problems remaining - like road runoff, septic system pollution, lawn fertilizer and animal waste - are more elusive, requiring the focused efforts of many partners, bringing ideas and resources to the table and crafting local responses to local watershed problems.

While Rhode Island has not had a comprehensive statewide watershed resource management framework in the past, concepts of the Watershed Approach have been and are being, applied in various locations across the state as outlined below.

Within DEM, the **Narragansett Bay Estuary Program** (NBEP) was created to develop and implement a management and conservation plan for the Bay's watershed. As part of the federal National Estuary Program, the NBEP draws upon the experiences of this network of watershed-based programs, designed to use a collaborative process to protect, preserve and restore the nation's important estuaries. Since 1993, the NBEP has been meeting the goals of this plan by creating partnerships for action, developing the sound science needed for management decisions, informing stakeholders, decision-makers and the public of critical watershed issues, and leveraging funds to support watershed solutions.

DEM worked closely with citizens, government officials and farmers in the **Stafford Pond Watershed** in Tiverton, R.I., to solve nonpoint source pollution problems affecting this regionally-important waterbody. A DEM watershed coordinator facilitated a stakeholder process leading to completion of a management plan and implementation of "best management practices" to reduce pollution. DEM recently completed a federally-required plan that determines pollutant loadings and ways to reduce those loadings to match the assimilative capacity of the pond. This is the first Total Maximum Daily Load (TMDL) plan completed for Rhode Island and provides an excellent model for further such plans.

The **Aquidneck Island Partnership** is a public/private collaboration to promote environmental conservation that is compatible with a healthy economy for the Island's three municipalities: Middletown, Newport and Portsmouth. The Partnership's goal is to identify common interests and implement activities that protect the Island's unique character and quality of life. The Partnership is preparing a document that presents a vision of Islanders' hopes and concerns for the future, has provided municipal training workshops, is developing a growth management strategy, and has initiated a joint Transportation Improvement Program for the Island.

The **Pawcatuck Watershed Partnership** brought together more than 40 organizations, government officials, and citizens to identify the issues and concerns most important to people working and living in the watershed. The Partnership has produced significant reports and surveys, has sponsored a municipal training program and educational activities, and has engaged in a number of important collaborative research projects to monitor and assess the state of the watershed. Involvement in the Partnership has reduced conflicts of interest between partners, has expanded funding opportunities for partnership members, and has increased access to agency resources and expertise.

A watershed coalition has been formed in the **Woonasquatucket River Watershed** to address the pressures on this urban/suburban river system, designated last year as an American Heritage River. This coalition consists of

committed stakeholders who seek improved water quality, expanded recreational opportunities for urban and suburban residents, cleanup of contaminated sites, revitalization of urban parcels, and restoration of watershed resources.

The SWA Coordinating Council continues to meet on a regular basis. The Council has requested that the PRP provide recommendations on the following issues as they related to the SWA: workplans and budgets; information systems and data management; education and outreach; technical assistance and grants; and policy and decision making. The PRP was also asked to develop criteria for selection of next targeted watersheds and for specific projects that could be brought to the Council. The Council requested that a funding workgroup be created to investigate funding sources for watershed actions and several Council members indicated that they would take an active role in the funding workgroup. The creation of other issue workgroups (and/or using existing workgroups such as the R.I. Coastal Habitat Restoration Team) has been and will likely continue to be discussed. As with the development of the SWA draft framework, the institutionalization of the SWA will be an evolutionary process. The success of this new program will depend on the support and combined efforts of watershed stakeholders.

2. Water Quality Standards Program

The Standards Section of the Office of Water Resources (OWR) implements the state's Water Quality Standards Program. The Water Quality Standards Program is responsible for ensuring compliance with the Federal Clean Water Act (CWA). The purpose of this program is to restore, preserve, and enhance the water quality of Rhode Island waters, to maintain existing uses and to protect the waters from pollutants so that the waters shall, where attainable, be fishable and swimmable, and be available for all designated uses and thus assure protection for the public health welfare, and the environment. These objectives are implemented through the water quality standards which are a fundamental element of the state's Water Quality Regulations. The water quality standards are developed to define water quality goals for the state's waters by deciding what their uses will be (designated uses) and by setting criteria necessary to protect those uses. In addition to establishing water quality goals for state waters, surface water quality standards also serve as the regulatory basis for the establishment of water-quality-based treatment controls and strategies beyond technology-based controls.

The present water quality condition of each waterbody may, or may not, fully support the designated goal. However, all activities which require an environmental approval must conform to the water quality criteria necessary to attain the designated use for that waterbody. Waters whose quality exceeds the minimum water quality criteria or water quality standard assigned to them are protected to maintain their high quality under the Antidegradation provisions of the Water Quality Regulations.

The surface waters in Rhode Island were classified in the 1960's and 1970's. Some changes have been made over the years. As part of the CWA-

mandated triennial water quality standards and criteria review, OWR finalized changes to the Water Quality Regulations in August 1997. The revisions to the Water Quality Regulations included modifications, updates and clarification of the designated uses of waters, classifications, criteria, rules and policies. The OWR modified the classifications such that the water quality goals of all Rhode Island waters meets the “fishable/swimmable” goals of the Clean Water Act. The surface waters of the state are assigned to one of three freshwater, or one of three saltwater, classifications. Each class is defined by the designated uses which are the most sensitive and, therefore, governing water use(s) which it is intended to protect. Surface waters may be suitable for other beneficial uses, but are regulated to protect and enhance the designated uses. In no case is waste assimilation or waste transport be considered a designated use. A fourth classification, Class C or SC, is available should it be proven through the Use Attainability process that this classification is appropriate. This C or SC classification is not, however, currently designated to any waterbodies. The Rhode Island Water Quality Classifications are as follows:

Freshwater:

- (a). Class A[@] - These waters are designated as a source of public drinking water supply, for primary and secondary contact recreational activities and for fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.
- (b). Class B^{*} - These waters are designated for fish and wildlife habitat and primary and secondary contact recreational activities. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value.
- (c). Class B1^{*} - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class B criteria must be met.
- (d). Class C - These waters are designated for secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for compatible industrial processes and cooling, hydropower, aquacultural uses, navigation, and irrigation and other agricultural uses. These water shall have good aesthetic value.

[@] Class A waters used for public drinking water supply may be subject to restricted recreational use by State and local authorities.

* Certain Class B and B1 waterbody segments may have partial use designations assigned to them.

Seawater:

- (a). Class SA^{*} - These waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation and industrial cooling. These waters shall have good aesthetic value.
- (b). Class SB^{*} - These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.
- (c). Class SB1^{*} - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class SB criteria must be met.
- (d). Class SC - These waters are designated for secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

* Certain Class SA, SB and SB1 waterbody segments may have partial use designations assigned to them .

In addition, the state has incorporated partial use classifications into the Water Quality Regulations. Partial use denotes specific restrictions of use assigned to a waterbody or waterbody segment that may affect the application of criteria. For example, a partial use designation may be appropriate where waters are impacted by activities such as combined sewer overflows and concentrations of vessels.

Partial Uses:

- (a). CSO - These waters will likely be impacted by combined sewer overflows in accordance with approved CSO Facilities Plans and in compliance with rule 19.E.1 of the Water Quality Regulations and the Rhode Island CSO Policy. Therefore, primary contact recreational activities; shellfishing uses; and fish and wildlife habitat will likely be restricted.

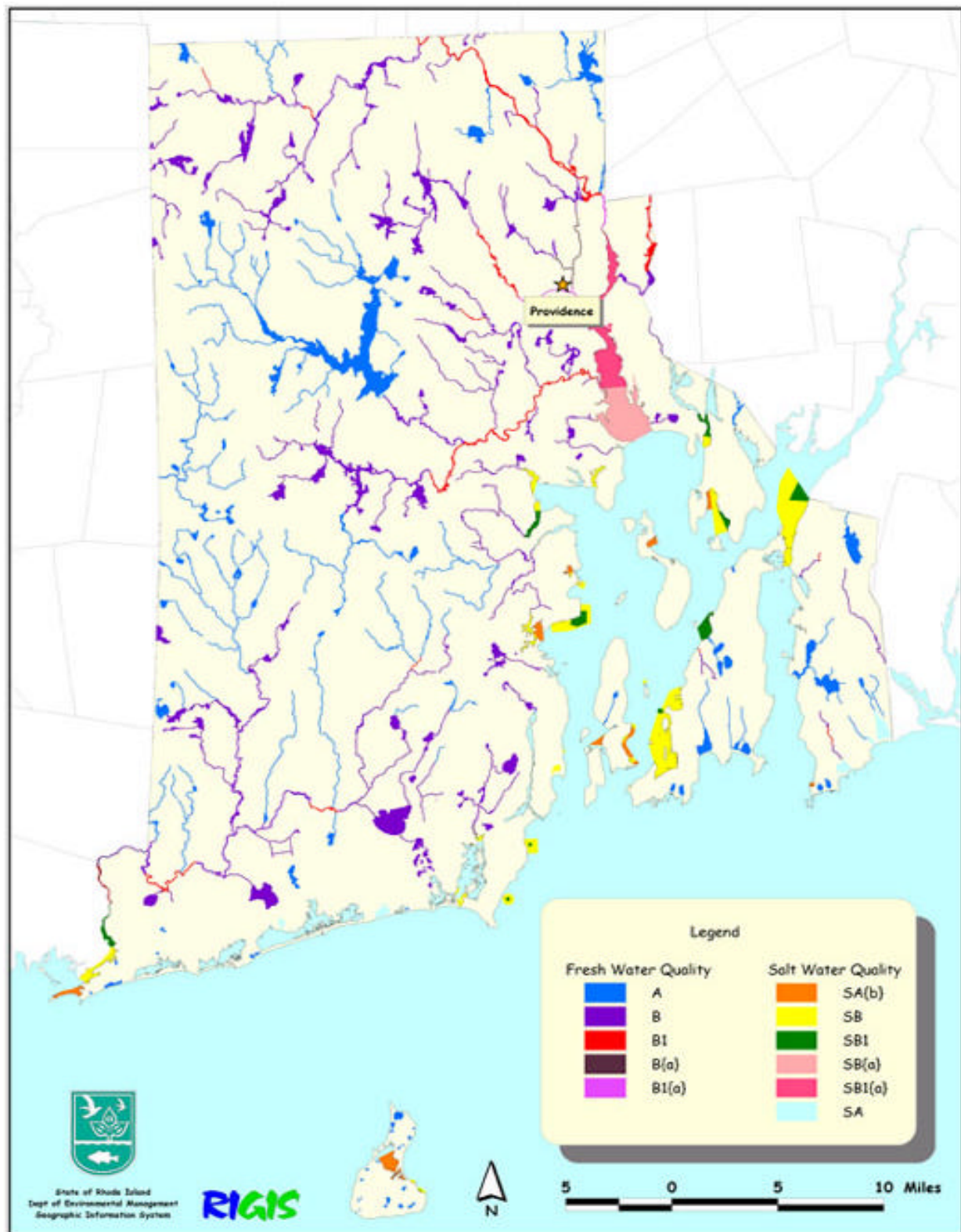
- (b). Concentration of Vessels - These waters are in the vicinity of marinas and/or mooring fields and therefore seasonal shellfishing closures will likely be required as listed in the most recent (revised annually) RIDEM document entitled Shellfish Closure Areas. For Class SA waters, all Class SA criteria must be attained at all times.

The surface waters of the state are classified according to the list of water segments in Appendix A of the Water Quality Regulations. For waters not listed in Appendix A, the following apply:

- (1). All streams tributary to Class A waters shall be Class A.
- (2). All freshwaters hydrologically connected by surface waters and upstream of Class B, B1, SB, SB1, C or SC waters shall be Class B unless otherwise identified in Appendix A of these regulations.
- (3). All other fresh waters, including, but not limited to, ponds, kettleholes and wetlands not listed in Appendix A shall be considered to be Class A.
- (4). All seawaters not listed in Appendix A shall be considered to be Class SA. All saltwater and brackish wetlands contiguous to seawaters not listed in Appendix A shall be considered to be Class SA.
- (5). All saltwater and brackish wetlands contiguous to seawaters listed in Appendix A shall be considered the same class as their associated seawaters.

The last triennial revisions to the water quality criteria and standards included adoption of updated aquatic life criteria, human health criteria and dissolved criteria for metals. The Water Quality Standards Program is coordinating with Region I EPA and the other New England states in a pilot project to develop biocriteria using a Regional approach. Forty-five stream sites in RI have been monitored for macroinvertebrates using EPA's Rapid Bioassessment Protocol since 1992. The data collected from these stations are being used in biological assessments and towards the development of biocriteria for the region and state.

Figure 2-1 Rhode Island Water Quality Standards Map



3. Point Source Control Program

The OWR regulates the design, construction, and operation and maintenance of wastewater treatment facilities. Wastewater discharge permitting and the implementation of the pretreatment program as well as stormwater permitting, is carried out by OWR through the federally delegated Rhode Island Pollution Discharge Elimination System (RIPDES) Program. The OWR staff conduct operation and maintenance inspections and compliance evaluations at all major and minor municipal facilities. Review and approvals of wastewater facility plans, engineering reports and engineering plans and specifications for WWTF improvements, sanitary sewer systems and marine sewage pumpout facilities are conducted by the OWR staff.

a. Permitting

i. RIPDES

The Office of Water Resources (OWR) was delegated the authority to implement the National Pollution Discharge Elimination System (NPDES) Program, referred to as the RIPDES Program in Rhode Island, on September 17, 1984. The focus of the permitting process has shifted from a treatment technology approach used in the past, to now stress the development of water quality based limitations that ensure that the receiving water will comply with applicable water quality criteria. Currently, the RIPDES Program has 19 active major municipal permittees with a total average daily permitted flow of 193.55 MGD and 6 active major industrial permittees with a total average daily permitted flow of 4.246 MGD. In addition to major facilities, the RIPDES Program is also responsible for permitting minor facilities. Figure 2-2 shows the location of the major RIPDES permittees.

Ninety-six percent of the total industrial and municipal RIPDES permits either contain water quality based limits or an analysis has been conducted which shows that water quality based limits are not necessary. The resulting permits typically contain limitations which permittees are unable to immediately comply with and, therefore, compliance schedules must be developed. It is a priority of the RIPDES Program to ensure that permittees complete the steps necessary to ensure compliance with water quality based permit limits.

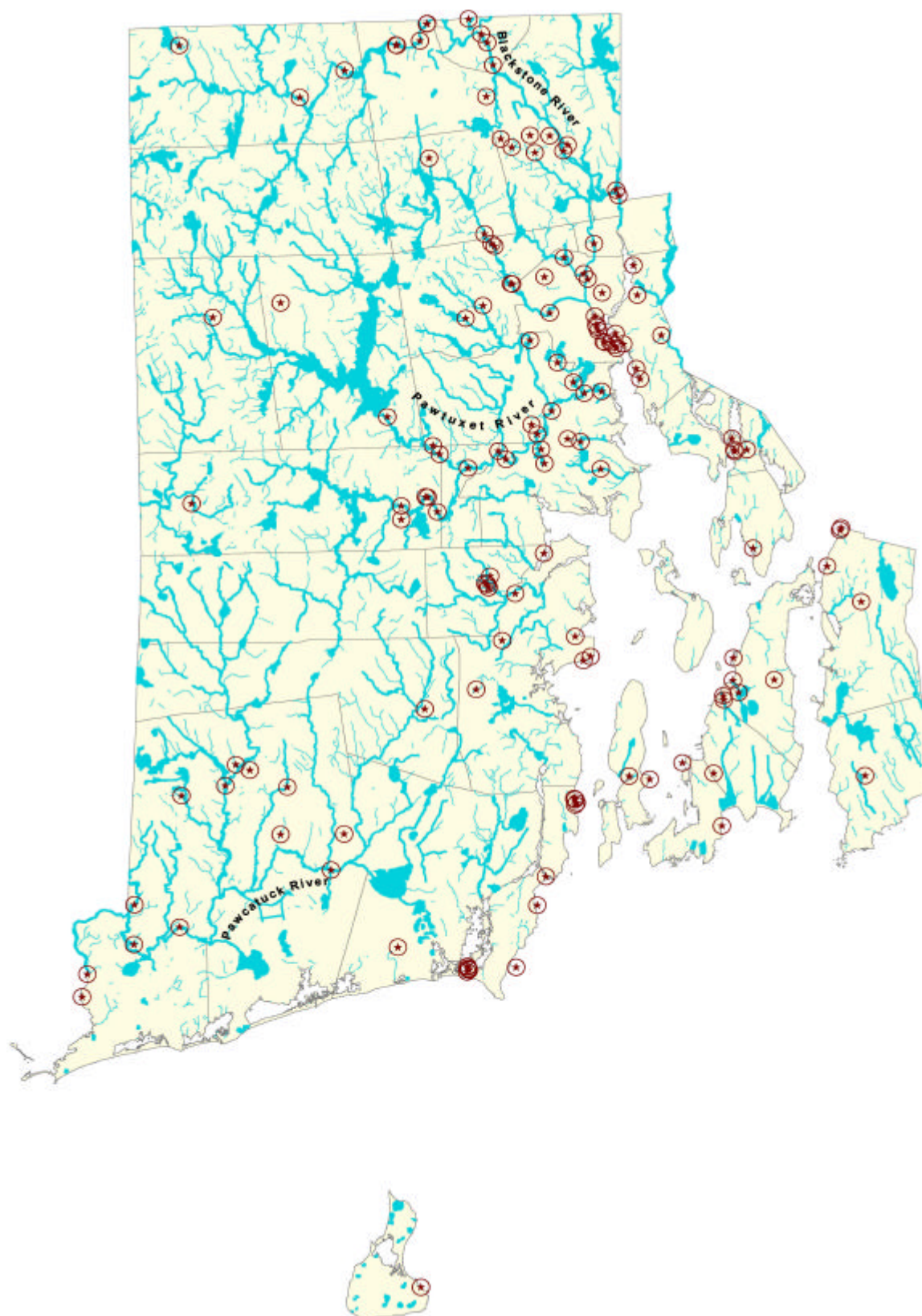
The RIPDES Program is also involved in the Narragansett Bay Commission (NBC) and Newport Combined Sewer Overflow (CSO) abatement planning projects. Currently there are three CSO treatment structures in Rhode Island. The NBC's Wet Weather Facility located at the Fields Point Wastewater Treatment Facility (WWTF) provides primary treatment for up to 123 MGD of wet weather flow. Newport's Washington Street CSO Facility provides storage for flow resulting from up to a three month storm and provides treatment for flows up to the one year storm. The third

CSO treatment facility is Newport's Wellington Avenue Micro-strainer facility.

The NBC has finished a system-wide CSO facilities plan. Based on meetings with the CSO Stakeholder Group, of which the OWR and other interested parties were members, the NBC has revised the preferred CSO management alternative. The newly recommended alternative features 2 tunnel systems (the Main Spine Tunnel and the Pawtucket Tunnel), CSO interceptors, various sewer separation projects, a wetland/lagoon treatment system, and an upgrade to the Bucklin Point WWTF's treatment system. The total estimated project cost is \$391 million.

Other RIPDES Program responsibilities include the following: issuance of RIPDES permits to discharges necessary for the remediation of contaminated groundwater at Superfund and RCRA sites (including Davis Liquid, Rose Hill and Stamina Mills); issuance of general permits for discharges associated with the treatment of gasoline and/or #2 fuel oil contaminated groundwater; inspections of permitted facilities; and finalization of a general permit for discharges of non-contact cooling water.

Figure 2-2 : Locations of RIPDES Discharges



ii. Pretreatment

OWR evaluates the status of the Publicly Owned Treatment Works (POTWs) Industrial Pretreatment Programs through Pretreatment Audits, Pretreatment Compliance Inspections (PCIs), review of updated program documentation as required (e.g., sewer use ordinances, technically-based local limits evaluations, enforcement response plans, sampling/inspection procedures, etc.), and review of annual reports required by POTW RIPDES permits. Moreover, the OWR continues to provide the POTWs with technical assistance and guidance in categorizing Industrial Users, interpretation and implementation of pretreatment regulations, administration of their pretreatment programs and enforcement issues.

The OWR provides ongoing oversight of fifteen approved local pretreatment programs. These programs regulate approximately 300 Significant Industrial Users (SIUs), over half of which are subject to Federal Categorical Pretreatment Standards.

The OWR's Pretreatment Section is also responsible for evaluating and assisting approved local pretreatment programs by regularly reviewing requests for modifications to existing local pretreatment programs in accordance with Federal and State Pretreatment Regulations.

A quarterly report summarizing all pretreatment activities is developed and submitted to the EPA. Pretreatment Enforcement Tracking (PETs) data is entered directly into the EPA central computer database.

iii. Stormwater

The OWR initiated a Stormwater Permitting Program using funds from EPA's Section 104(b)(3), in 1992. Stormwater regulations and general permits for discharges of stormwater associated with industrial activity and construction activity became effective on March 9 and March 19, 1993, respectively. These general permits were reissued in March 1998. The OWR continues to permit both construction activities and industrial facilities under the stormwater permitting program.

The OWR is also developing Phase II stormwater regulations that will cover operators of small separate storm water systems (MS4s) in urbanized areas. As part of the Phase II program, the OWR must perform the following activities: develop criteria and processes to designate MS4s; develop Phase II regulations; and develop and issue permits. The OWR continues to distribute information on the stormwater permit Program to industries and municipalities.

Additionally, the OWR will be working on the issuance of a multi-sector stormwater permit. This permit will establish industrial "sectors" for various groups of industrial categories. The multi-sector stormwater permit will have permit requirements that are specific to each industrial category.

iv. Sludge Management

The DEM/OWR has “Rules and Regulations Pertaining to the Disposal, Utilization and Transportation of Wastewater Treatment Facility Sludge.” The regulations contain requirements dealing with land application, land disposal, composting (and other treatment methods), incineration, and distribution/utilization of sludge generated by municipal wastewater treatment facilities. The state is reviewing numerous applications for Orders of Approvals for sludge disposal projects including several projects that involve the beneficial reuse of treated sludge. DEM anticipates completing its review of all the applications by the end of FY01. The state will continue to issue Orders of Approval to wastewater treatment plants for the treatment, disposal, distribution, and utilization of sewage sludge, in accordance with the regulations. All sludge sites are inspected at least once per quarter to assure compliance with the regulations

v. Water Quality Certification

The OWR administers the Water Quality Certification (WQC) Program aimed at insuring that certain types of projects or activities do not adversely impact the quality of the state’s water resources. Water Quality certification is required by Section 401 of the Clean Water Act.

The WQC review consists of an evaluation of conformity with water quality standards, especially designated uses. Included in the certification process are activities such as dredging projects, fill projects, site disturbances, marina construction or expansion, flow alterations and harbor management plans. The recent Water Quality Regulation triennial review adopted new processing procedures for WQC approvals.

vi. Enforcement/Permit Compliance

DEM recognizes that protection of water quality requires effective compliance oversight and enforcement of regulations concerning water pollution control. Under DEM's new structure, certain enforcement capabilities are consolidated within the Office of Compliance and Inspection (OC&I). Generally, this new Office will be issuing formal Notices of Violation (NOVs) and investigate the majority of water-related complaints. Contested matters are generally appealed to the DEM Office of Administrative Adjudication.

OWR intends to encourage and/or maintain high level of voluntary compliance in programs such as RIPDES via administrative actions. Compliance matters requiring formal enforcement will be referred from OWR to OC&I as warranted. Resolution of any formal NOV is achieved by close coordination between the two offices, particularly in matters that involve obtaining a permit. When needed, OWR supports formal enforcement actions by providing additional technical staff expertise and assistance in contested cases or as needed.

Within the RIPDES Program, OWR oversees compliance with permit requirements including computerization of data and issuing SNC letters. The RIPDES and Pretreatment Programs utilize EPA's Permit Compliance System (PCS) to track compliance with program requirements including, but not limited to the generation of the Quarterly Non-Compliance Reports (QNCRs).

vii. Wastewater Treatment Facilities Program

This program is responsible for the review and approval of wastewater facilities plans (a 20 year master plan for a community's wastewater needs), engineering reports and engineering design plans and specifications. Plans and specifications reviewed and approved include wastewater treatment facilities (WWTF) improvements, wastewater collection system expansion/improvements and marine sewage pumpout facilities. In addition, this program routinely performs field inspections of wastewater-related construction projects which are funded by the OWR's Funding Assistance Program.

This program also has an active role in reviewing privatization agreements between municipalities and private companies hired to operate and maintain wastewater treatment and/or collection facilities, as well as providing system-wide capital improvements.

b. Point Source Control Monitoring Programs

i. Whole Effluent Toxicity Testing

Nineteen major wastewater treatment facilities and 5 major industrial facilities are required to perform bioassays to evaluate whole effluent toxicity associated with their discharges. The results of these bioassays are used to determine whether further biomonitoring and/or toxicity reduction is needed in addition to permit limitations. Oversight and implementation of the WET testing program and evaluation of a whole effluent toxicity enforcement strategy is conducted by the OWR.

ii. User Fee Program

Chapter 46-12.4 of the Rhode Island General Laws authorized the Director of the Department of Environmental Management (DEM) to establish a system whereby fees were to be assessed for point source discharges into State waters. For the purposes of this act, a program has been implemented since 1983 in which effluent samples are collected at a minimum, annually, at all municipal dischargers and selected major and minor industrial dischargers. This constitutes sampling at a total of approximately 25 sites per year (cycle), with the major facilities being sampled 2 to 4 times per year. Sampling frequency depends upon the amount and type of pollutants present in the sample, with more frequent sampling performed at those discharges which are of greater environmental concern. These effluent samples are analyzed for EPA "Priority Pollutants." This data is utilized in permit revision evaluations and water quality impact analyses. The following year(s) monitoring efforts (such as determining which pollutants will be monitored) are based on the findings of the previous year's sampling efforts.

iii. Wastewater Facility Operation and Maintenance/Compliance Evaluations

The purpose of the Operation and Maintenance (O & M) Section within the OWR is to protect the quality of the state's waters by ensuring proper operation and maintenance of wastewater systems. The O&M staff inspect all major municipal dischargers every eight weeks. In addition, staff inspects the 9 minor municipal dischargers two times per year. These inspections are comprised of a full plant walk-through and discussion session with responsible plant personnel. At each discussion session, DEM inspectors comment on general plant operations, maintenance, or housekeeping improvements. Staff also inspects the various off-site pump stations that are part of a wastewater facility's collection system.

In addition to regular monthly operations and maintenance inspections, the State will continue annual inspections of major permittees (municipal and industrial) utilizing EPA Compliance Evaluation Inspection Forms. In conjunction with these inspections, effluent samples may be collected and analyzed for the parameters the permittee is authorized to discharge. The results are used to determine the validity of the dischargers' self-monitoring data and to determine whether the permittee is meeting effluent limits

The O&M staff also investigate and report for possible enforcement actions on any failures, emergencies or bypasses at these facilities or their pump stations. There are roughly 40 such occurrences each year.

O&M staff also assist in the administration of EPA QA/QC programs for wastewater laboratories.

Projects for 2000-2002 include redrafting the O&M regulations and devising regulations for the re-use of treated wastewater.

iv. Weekly Coliform Bacteria Monitoring

Wastewater treatment plants which may potentially impact shellfish growing areas are sampled on a weekly basis when the upper Narragansett Bay is open to shellfishing. The final effluent is analyzed for total and fecal coliform bacteria and a total chlorine residual. Pertinent data such as the flow rate and chlorine feed rate is also recorded. When the Bay is closed, all data, except the bacterial data, is taken. However, if operational problems exist at the treatment plant, then bacterial data is also taken. Following is a listing of the affected treatment facilities:

- Bristol WWTF
- Cranston WWTF
- East Greenwich WWTF
- East Providence WWTF
- Narragansett Bay Commission - Field's Point
- Narragansett Bay Commission - Bucklin Point
- Warren WWTF
- Warwick WWTF
- West Warwick WWTF

4. Financial Assistance

In order to achieve the water pollution abatement/water quality goals of the State of Rhode Island, the Office of Water Resources (OWR) manages several funding assistance programs intended to aid governmental entities, businesses, and individuals in the planning, design and construction of their projects. These financial assistance programs consist of funds provided by both the State and federal government.

The State Revolving Fund (SRF) is Rhode Island's largest financial assistance program. The SRF program is co-managed by OWR and the RI Clean Water Finance Agency. Since the program's inception in 1990, the SRF program has awarded over \$180,000,000 in below market rate interest loans for over 110 projects in 19 communities. While sewer extensions are the type of project most often funded, the SRF program has also provided assistance to wastewater treatment facility improvements, pumping station repairs and landfill closures. In fact, Rhode Island was only the third state nationally and the first east of the Mississippi to use SRF funds to close a landfill. The SRF program has recently developed a loan program to provide access to homeowners to low cost financing for septic system repairs.

Prior to being replaced by the SRF program, the Construction Grants program was the primary source of water pollution abatement financing. The Construction Grants program, which was responsible for bringing all wastewater treatment facilities in the state to secondary treatment, awarded its last major grant in 1990. The Construction Grants program was closed out in 1998.

Two state bond funded programs are expected to award their last grants in 2000. The Aqua Fund, which funded many innovative water quality protection projects, besides point source and nonpoint source abatement projects, will award approximately \$550,000. Most of these funds will support planning and wastewater treatment projects.

The Non-Governmental Water Pollution Control Facilities Fund has roughly \$150,000 to award to businesses, industries, farmers and non-profit organizations. In the past this program funded industrial pretreatment units, new septic systems, marina pumpout facilities, and agricultural best management practices. Table 2-1 below briefly details the funding provided by the OWR financial assistance programs:

Table 2-1 Funding Sources and Assistance Awards

Fund	Since 1972 CWA	Last 10 Years (1989 – 1999)	Last 2 Years (1998 – 1999)
SRF leveraged	\$146,423,000	\$146,423,000	\$62,810,000
SRF direct (state match)	\$26,259,232	\$26,259,232	\$18,575,000
SRF state fund	\$1,095,000	\$1,095,000	\$175,000
Construction Grants	\$284,200,000	\$15,700,000	\$1,120,000
Construction Grants State Match	\$64,600,000	\$3,100,000	\$224,000
RI Non-Governmental Fund•	\$1,315,085	\$1,315,085	\$494,230
RI Interceptor Bond Fund••	\$1,061,832	\$1,061,832	\$0
RI Sewage and Water Supply Failure Fund	\$5,000,000	\$5,000,000	\$0
RI Pawtuxet River Bond Fund	\$5,971,433	\$5,971,433	\$1,366,800
RI Aquafund	\$9,004,943	\$9,004,943	\$76,200
TOTAL	\$544,930,525	\$214,930,525	\$84,841,230

• This fund provides grants to businesses, industries, and other non-governmental entities.

•• Includes \$54,572 in low interest ISDS repair loans to individuals.

5. Narragansett Bay Estuarine Program CCMP

The Narragansett Bay Estuarine Program (NBEP) is a federally funded program authorized in the Federal Clean Water Act, Section 320, National Estuary Program. It's purpose is to protect and restore water quality, natural resources, critical habitats, and uses through implementation of the Narragansett Bay Comprehensive Conservation and Management Plan (CCMP). The CCMP has been adopted as an element of the State Guide Plan and includes strategies for achieving the stated objectives for protecting and/or restoring the water quality and resources of Narragansett Bay.

The CCMP is based on the following overall goals:

- To prevent further degradation and incrementally improve water quality in developing coastal areas with deteriorating water quality;
- To protect diminishing high quality resource areas throughout the Bay watershed;
- To more effectively manage commercially, recreationally, and ecologically important estuarine-dependent living resources;
- To rehabilitate degraded waters in the Bay watershed and restore water quality-dependent uses of Narragansett Bay;
- To establish necessary interstate and interagency agreements and mechanisms to coordinate and oversee implementation of the Narragansett Bay Comprehensive Conservation and Management Plan.

The project staff are currently implementing priority recommendations of the CCMP (see Chapter III.F.). Specific program strategies include: creating projects using partnership with municipalities, agencies and nonprofits; securing the scientific data needed to support policy initiatives and develop effective management strategies; providing outreach on the Bay and watershed ecosystem through workshops, conferences, and educational events; securing additional funding for CCMP implementation; addressing priority water quality and living resource issues in the Bay; identifying and analyzing emerging Bay issues (e.g., introduced species); and building work plans that reflect the action items identified in the CCMP and at the Bay Summit 2000.

6. Nonpoint Source Control Program

The RIDEM's Nonpoint Source Pollution Management Program was established in accordance with Section 319 of the Water Quality Act of 1987. This non-regulatory program was previously administered by the Department's Office of Environmental Coordination. Pursuant to the Department's reorganization in 1996, the Nonpoint Source Program was integrated into the Watershed Approach and is now administered by the OWR. This Program implements the Nonpoint Source Management Plan with the goals of mitigating existing and preventing subsequent nonpoint source pollution.

The Program is involved in a number of activities. In particular, over the past year key activities have included: (1) Septic System Maintenance Policy Forum; (2) Wetlands policy and programmatic streamlining initiatives; (3) support of TMDLs; (4) support of improved land management and (5) solicitation of community projects through a competitive granting process.

- a. Septic Systems - Nonpoint Source (NPS) program work on septic system

issues has largely been guided by the Septic System Maintenance Policy Forum (SSMPF). The NPS Program formed the SSMPF in November 1995 to promote proper onsite wastewater management and to implement onsite disposal system (OSDS) management measures of the Coastal Nonpoint Pollution Control Program (CNPCP). The SSMPF has provided an excellent arena for the development of innovative policy. Three important outputs have resulted: (a) *Septic System Check-Up*, (b) the Community Septic System Loan Program (CSSLP), and (c) financial and technical assistance to communities that rely on septic systems.

Septic System Check-Up is a unique guidance manual that is changing the septic system inspection industry. Previously, no standards existed for proper inspection and maintenance of septic systems. The unavailability of standards has been particularly problematic for home sellers and buyers. Nonstandardized inspections leave both parties with nagging uncertainty. Lack of technical documentation on septic system maintenance also creates controversy during the development of local wastewater management programs. In several instances, such controversy may have prevented the adoption of programs and ordinances. *Septic System Check-Up* fills the information gap with two types of inspections:

- 1) A maintenance inspection to determine if pumping and minor repairs are needed; and
- 2) A functional inspection for use during property transfer.

Septic System Check-Up not only standardizes inspections procedures but in many cases documents procedures for the first time and some procedures were actually invented for the handbook.

CSSLP (to be promulgated in 1998) will provide low-interest loan funds for the purpose of septic system repair and replacement. CSSLP represents the first-ever, self-renewable, statewide funding source for septic system repair replacement in Rhode Island. It is also an innovative use of the State Revolving Fund (SRF) and marks the first time that a New England state has used SRF in such a fashion. CSSLP is being initiated and administered by the Rhode Island Clean Water Finance Agency, however, NPS program staff have been important to the early planning for the program. For instance, the Rhode Island Nonpoint Source Bond Fund has provided grants for four communities to pilot onsite wastewater management programs for CSSLP funding in the Salt Ponds Region. The pilot projects are overseen by NPS staff.

Additional state funding is being used to assist other Rhode Island communities in developing eligibility for CSSLP. Currently, 12 communities are developing eligibility through state NPS grants. Rhode Island DEM anticipates that 12 or more additional communities share this need. DEM continues to work to assist all of these communities.

b. Land Use – In 1996, work was completed on the *Nonpoint Source Pollution Control Workbook for Rhode Island Cities and Towns*. The workbook was developed with Section 319 and 320 funds by the Rhode Island Chapter of the APA, the APA's Chicago based Research Department and Horsely and Whitten. The workbook is intended to assist local government officials, engineers, water quality specialists, planners and citizens in understanding the

impacts of NPS pollution. It focuses specifically on describing the nature of NPS pollution and BMPs.

The NPS program has completed its Nonpoint Source Consistency Review project. Thirty-nine cities and towns submitted community comprehensive plans (CCP) for NPS review. The NPS program continues to review plans and plan revisions as appropriate. The NPS program also continues to distribute technical land-use materials to communities as requested. The *Rhode Island Community Nonpoint Source Management Guide* has been particularly valuable and is frequently used by URI/CE in their training workshops.

c. Groundwater Implementation Activities – Since 1996, the wellhead enforcement initiative conducted 17 inventories including 29 wellhead areas and 40 wells were investigated. Over 1997 the Wellhead Protection Technical Assistance and Outreach project focused on (a) integrating public outreach for the Hopkinton/Richmond area, (b) preparation of a wellhead protection plan for W. Greenwich, and (c) a road-sign project in S. Kingstown. Technical assistance was provided to six communities and included a wide range of outreach activities.

d. Nonpoint Source Pollution Request for Competitive Grant Proposals

In 1999, for the first time in several years, the NPS program issued a competitive solicitation for grant proposals using incremental 319(h) funding (i.e., Clean Water Action Plan funding). This process is being repeated in FY2000 and for as many subsequent years as the budget will allow.

In response to the NPS-RFP, DEM received 26 proposals for a total of \$1,955,814 and funded 17 projects, totaling \$885,854. As a result of the investment via local grants, the following is expected to occur:

- Eight additional communities will commit to developing onsite wastewater management programs. This will bring the statewide total to 14 communities with repair/management programs. This will cover approximately half the Rhode Island communities with need for repair programs and will make financial assistance available to approximately 50% of Rhode Islanders served by septic systems.
- Invest approximately \$430,000-530,000 in Group 1 waterbodies to develop and implement watershed restoration actions, with over 80% of funds targeting improved stormwater management. Also, OWR's water quality assessment work provides a strong technical basis for these investments.
- Invest \$250,000 in other watersheds to abate documented water quality problems and restore aquatic habitats of urban areas. Approximately, \$100,000 of these funds will go to American Heritage Rivers.

Table 2-2 shows a list of projects and Figure 2-2 shows their location.

Table 2-2. Watershed Restoration Actions

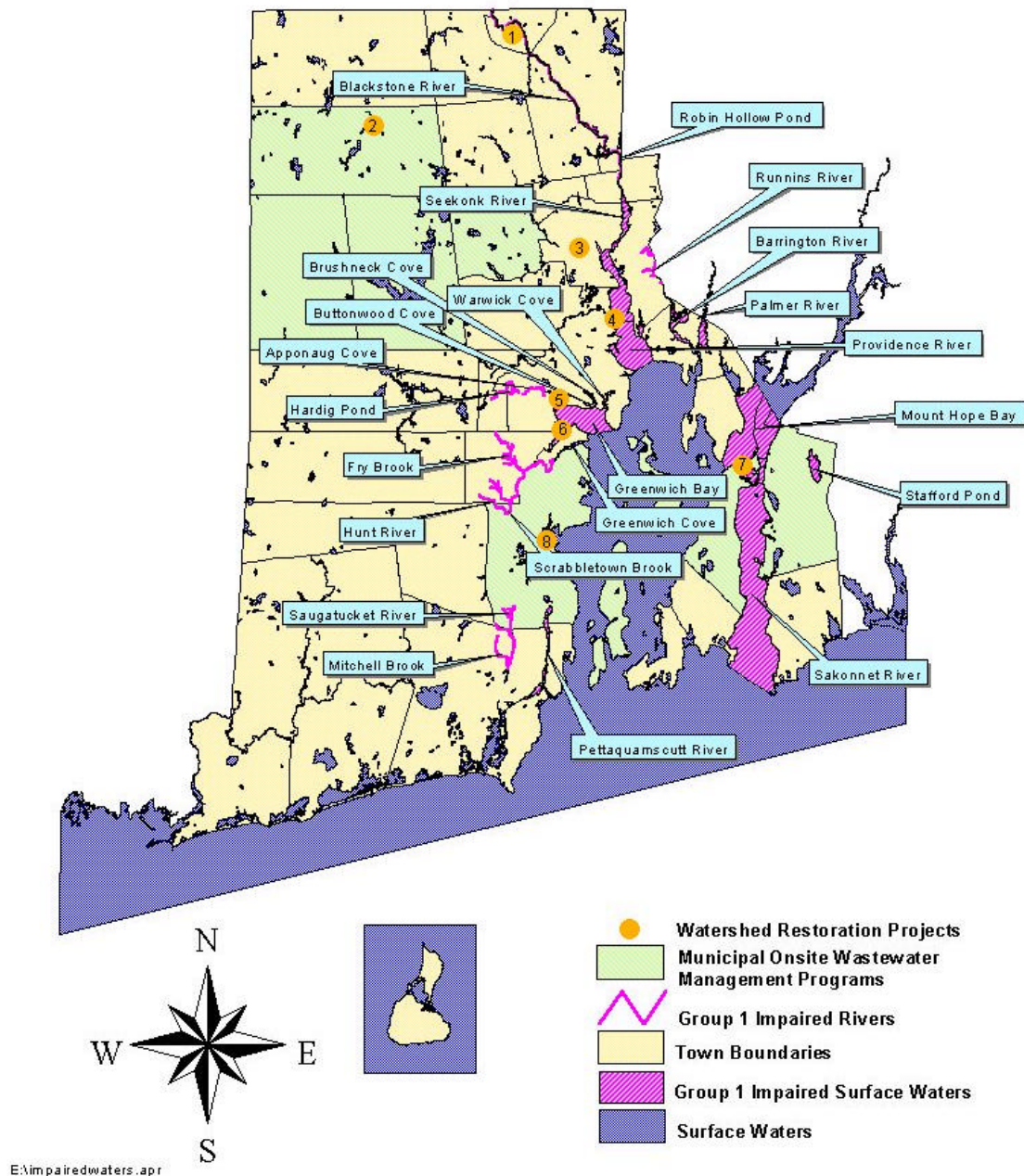
Location (Waterbody & map location)	Sponsor	Project Name	Award	Anticipated Completion Date	Impairment of Concern and Suspected Source	Deliverables and Anticipated Resource Improvement
Cass Pond map point: ❶	Woonsocket	Cass Pond Restoration	\$36,500	September 2000 (12months)	Fieldwork has revealed some soil erosion and stormwater impairments. Cass Pond is hydrologically connected to the Blackstone River via Sylvestre Pond.	This project is for the design of stormwater BMPs to eliminate sedimentation to Cass Pond. This will implement recommendations of a previous 319 project.
Chepachet River map point: ❷	Glocester	Onsite Construction of Demonstration Wastewater Systems and Stormwater Management Planning	\$72,212	September 2001 (24 months)	A recent study, commissioned by the Town of Glocester, indicates some pathogens and nutrients from wastewater and stormwater inputs to the Chepachet River and Chepachet River Aquifer	This project will demonstrate innovative septic system use for sustainable development in a mill-village setting. The project will also identify suitable locations for stormwater retrofits. A related project to be funded under the RI NPS Bond Fund will develop a wastewater management program.
Woonasquatucket River map point: ❸	Providence	Woonasquatucket/Lincoln, Lace and Braid Sluiceway Removal and Wetland Restoration	\$71,400	September 2001 (24 months)	Biodiversity, pathogens, PCBs, dioxin and metals--this project will address VOCs, low Do, bacteria and habitat/wetland restoration	This project is primarily to remove a degraded sluiceway at the Lincoln, Lace and Braid site and restore it to a wetland with good habitat value. In addition, fencing will be placed around the site to prevent illegal dumping. Pre- and post-monitoring will be conducted in order to measure specific water quality improvements.
Greenwich Bay map point: ❹	Warwick	Greenwich Bay Watershed Stormwater Treatment Feasibility and Implementation Project	\$240,000	September 2001 (24 months)	Pathogens, nutrients and hypoxia--Stormwater outfalls were previously identified in an Aqua Fund project or by URI in a TMDL study.	This project involves design, permitting and construction of 8 BMPs including Vortech Stormwater Treatment Systems and vegetated detention basin/grassy swales. The project will benefit commercial/recreational shellfishing, beach and other recreational resources
Greenwich Bay map point: ❺	SRICD	Brush Neck Cove Stormwater Abatement and Restoration Interim Measures	\$77,463	September 2000 (24 months)	Pathogens, nutrients and hypoxia--Stormwater outfalls were previously identified in an Aqua Fund project and by URI in a TMDL study.	This project will investigate retrofit potential of 10 stormwater systems, which were identified, previously, as part of an Aqua Fund project. Two retrofits will be designed, which will benefit commercial and recreational shellfishing, beach and other recreational resources. The project will also involve public outreach and technical assistance to homeowners in the area.

Table 2-2.
Cont'd

Location (Waterbody & map location)	Sponsor	Project Name	Award	Anticipated Completion Date	Impairment of Concern and Suspected Source	Deliverables and Anticipated Resource Improvement
Greenwich Bay map point: ⑤	SRICD	Greenwich Bay Stormwater Management Program	\$21,781	March 2001 (18 months)	Pathogens, nutrients and hypoxia-- Specific sources will be examined for engineering feasibility during project.	This project is to develop a priority listing of stormwater systems in need of repair and maintenance for future action by the city.
Greenwich Cove map point: ⑥	E. Greenwich	Greenwich Cove Stormwater Feasibility	\$15,000	July 2000 (10 months)	Hypoxia and nutrients--E. Greenwich has identified three stormwater outfalls, which are considered major contributors.	Project will recommend BMP designs for stormwater abatement. Eventual implementation will benefit shellfishing and recreational resources.
Sakonnet River (Portsmouth Pk.) map point: ⑦	Portsmouth	Facilities Plan Update and Feasibility Study for Portsmouth and Island Parks	\$60,000	December 2000 (15 months)	Pathogens--In a recent DEM study failed septic systems and stormwater were identified as sources of impairment.	Project will recommend BMP designs for stormwater and wastewater abatement. The study will concentrate on technical feasibility, locations of treatment facilities, and cost estimates. Implementation should help to reopen shellfishing area. A related project is to be funded under the RI NPS Bond Fund will develop a wastewater management program.
Wickford Harbor map point: ⑧	North Kingstown & STB	Wickford Harbor Stormwater BMP Feasibility and Smart Growth Implementation	\$59,384	September 2000 (12 months)	Wickford Harbor is conditionally closed to shellfishing, primarily due to its proximity to marinas.	Wickford Harbor is a polluted area that is very productive for shellfish. This project will involve development of engineering plans for constructed BMPs to control nitrogen and implementation of smart growth BMPs for sustainable development. This project will improve valuable eelgrass habitat.

Figure 2-3.

FY99 Nonpoint Source Pollution Projects in Group 1 Impaired Waterbodies (Includes Federal Clean Water Action Plan Funds)



e. Other Watershed Implementation Activities

- *Greenwich Bay Watershed* – During 1996 and 1997, two key 319 projects have furthered the restoration of Greenwich Bay. The Comprehensive NPS Watershed Project for Warwick and Brushneck Coves has continued to provide financial assistance for sewer hookups. In addition, the project has provided outreach through Save The Bay. The Greenwich Bay Technical Assistance and Outreach Project has provided funds to install innovative and alternative septic systems at five sites in the Greenwich Bay Watershed.
- *Runnins River Watershed* – Recent work in the Runnins River has focused on identifying storm drains, runoff points and associated drainage areas that are contributing the highest pollutant loadings during wet weather events. In October 1995, a monitoring study was conducted under the auspices of the NPS Program. Wet weather sampling and modeling has subsequently been used to establish hot spots in the watershed. A report, entitled *Runnins River Wet Weather Study*, was produced in June 1996 and three sites were identified for remediation. Money made available via an FY96 NPS grant will be used to provide BMPs. Currently, staff have been coordination with RIDOT which is undertaking a related design project.
- *Stafford Pond Watershed* – Stafford Pond is a 480 acre waterbody located in Tiverton, RI. The pond serves as a drinking water supply for residents of Tiverton and Portsmouth. Over the past several years, the pond has experienced frequent algal blooms, leading to taste and odor problems and prompting the Stone Bridge Fire District to upgrade its water treatment practices. In 1995, DEM awarded \$107,000 of a state NPS bond fund grant to Fugro East, Inc. to conduct an in-depth limnological investigation of the pond. The goals of the study were to assess the water quality of the pond and its tributaries, identify pollution sources, and develop cost-effective solutions for controlling pollution. The study began in February 1996 and was completed in 1997. Results indicate that the algal blooms are primarily the result of high phosphorus loadings, principally coming from a local dairy farm. The NPS Program has also provided funds for follow-up BMPs. Currently, a steering committee, which has met twice, is being used to help direct activities in the watershed.
- *Bailey Brook* – The Newport system supplies water to the Aquidneck Island communities of Newport, Middletown, and Portsmouth. For many island residents, this system provides the only readily available source of drinking water. Urbanization of the watershed has increased impermeable surface and raised stormwater runoff volumes and velocities. Greater stormwater runoff has led to increased flooding, accelerated erosion, and alteration of stream bed and reservoir bottom composition. Urbanization has also heightened runoff concentrations of heavy metals, pesticides, oil, road salt, organic chemicals, and nutrients. The NPS Program has provided

financial and technical support to the City of Newport to construct a stormwater runoff retention pond in the Bailey Brook Watershed.

- *Saugatucket River Watershed* – Upper Point Judith Pond is closed to shellfishing due to high fecal coliform bacteria levels. Recent data from the Salt Pond Watchers, a local citizens group, indicated water quality problems on the Saugatucket River which flows in to upper Point Judith Pond. The NPS program, along with the 604(b) Water Quality Management Planning program, contracted URI to conduct an investigation of the pollution sources to the river. The results of this study are being used to model water quality and perform a TMDL. Sampling for the project began in spring 1996 and was completed in late 1997.
- *Common Fence Point Salt Marsh Restoration* – Approximately 45 years ago, over 20,000 cubic yards of dredge spoil from Mount Hope Bay was deposited in the Common Fence Point tidal marsh/pond complex. The spoil deposition had completely altered the preexisting complex. In 1996 the NPS program provided the Common Fence Point Improvement Association with a Section 319 grant to remove the dredge spoil from more than five acres of tideland. Once the spoil had been removed, the work continued with the installation of a tidal flushing system and digging of a channel to reconnect the marsh with Mount Hope Bay. The restoration team also created a 2.6 acre salt marsh by transplanting seeds and shoots from marsh near the site. The previously existing dike was widened to a uniform width of 40 feet and water runoff was redirected to a sedimentation basin. This project has won two awards for excellence.
- *Galilee Salt Marsh Restoration* – DEM's Division of Fish and Wildlife has owned and managed the Galilee Bird Sanctuary since 1955. Construction of the Galilee Escape Road, which bounds the sanctuary to the north, took place in 1956. The roadway fragmented the wetland and interrupted normal tidal flow. This caused a dramatic change in habitats, decreasing salt marsh and increasing the abundance of common reed and scrub habitat. As a result, suitable habitats for salt marsh wildlife species declined, particularly for important migratory birds, including black ducks and several shoreline birds. Finfish and shellfish habitat and breeding ground was lost and the value of the area as a recreational and cultural resource greatly diminished. As a companion to a Coastal America Program project, the NPS program provided Section 319 funds to purchase and install tide and sluice gates. The tide and sluice gates have helped to restore normal daily tidal flushing and reinvigorate the salt marsh ecosystem.
- *Curran Brook Sedimentation Pond*--Curran Brook runs through an urbanized section of Cumberland to its terminus in Robin Hollow Pond. Robin Hollow Pond is major part of the Pawtucket Water Supply System, which serves over 100,000 people in the northeastern quarter of Rhode Island.

The Curran Brook Sedimentation Pond was developed and built using 319 funds granted by DEM in cooperation with the Pawtucket Water Supply Board, Northern Rhode Island Conservation District and NRCS. The sedimentation pond is designed to abate sediment, nutrients and fecal coliform.

- *Other Watershed Initiatives* – The NPS program has been involved in several other watershed projects as well. These include the Watchaug Pond Watershed Project, Zambarano Stormwater Basin and Wood-Pawcatuck Watershed Project.

f. Coastal Nonpoint Pollution Control Program (CNPCP)

The CNPCP was developed by the Coastal Resources Management Council (CRMC), the Department of Environmental Management, and the Division of Planning, with assistance from representatives of numerous environmental and trade organizations, local governments, the academic community and other state agencies. After an 18-month development process, the CNPCP was submitted to the National Oceanic and Atmospheric Administration and EPA in July 1995 in accordance with the requirements of section 6217 of the coastal Zone Reauthorization Amendments of 1990. Rhode Island became one of the first states to receive the formal conditional approval for its CNPCP from NOAA and the EPA in the fall of 1997. Rhode Island became only the second state to receive full approval of its CNPCP in April 2000.

7. Coordination with other Agencies

The Office of Water Resources coordinates activities with various other federal, state and local agencies and organizations. This coordination takes a number of different forms. In addition to EPA, examples of such coordination are as follows:

- a. Coastal Resources Management Council –OWR coordinates with CRMC on various matters including permit coordination, aquaculture, SAM Plan revisions, septic system matters and the pending establishment of a jurisdictional line between the agencies with respect to freshwater wetlands jurisdiction.
- b. Department of Health - DOH provides chemical analytical services and assistance to RIDEM under contract for various surface and wellwater samples as well as compliance and pretreatment monitoring. The OWR Groundwater section coordinates with the DOH Public Water Supply program on issues related to wellhead protection. The Groundwater Section coordinates with the DOH Office of Private Well Contamination on responses to individual homeowners. DOH assists the OWR in issuance of fish advisories and development of human health water quality

criteria and risk assessments for consumption of contaminated fish in addition to assessments of drinking water supplies for the Section 305(b) Report. The OWR also coordinates with the DOH on Drinking Water SRF program activities as well as other water supply issues.

- c. Office of Agriculture - Per the Memorandum of Understanding between DEM and NRCS, the Office will continue to coordinate with the Office of Agriculture on reviewing projects which require an Agricultural Wetlands permit. The Office will also continue to assist in the development and implementation of the strategy to prevent groundwater contamination from pesticides and nitrogenous fertilizers. The Office will also continue to assist the Agriculture programs on water quality issues relevant to any of their activities/projects.
- d. Natural Resource Conservation Service (NRCS)- Per the Memorandum of Understanding between DEM and NRCS, the Office will continue to coordinate with NRCS on Agricultural Wetlands issues. In addition, upon request, the Office will assist NRCS in agricultural water quality issues. The Office will continue to use the expertise of NRCS relevant to the watershed planning process and participate in the NRCS State Team meetings.
- e. Water Resources Board - The Water Supply Management and Groundwater (Wellhead) programs interact routinely with the Water Resources Board.
- f. USGS - The Office will continue to use the services of the USGS for monitoring of flow and chemical analyses within rivers in Rhode Island.
- g. URI - Through a variety of mechanisms, seeking professional advice and contracting professional services, the OWR interacts with the University. Examples of programs the OWR cooperates with include Sea Grant, the Graduate School of Oceanography, Natural Resource Sciences, the Department of Civil and Environmental Engineering, and the Cooperative Extension to name a few.
- h. Army Corps of Engineers (ACOE) – OWR participates in the Providence River Dredging Project Workgroup being coordinated by ACOE. OWR also coordinates with ACOE on programmatic general permit (PGP) process and habitat restoration projects.

C. COST/BENEFIT ASSESSMENT

A true cost/benefit assessment for the OWR is, at best, difficult to obtain. This is due to the complexities involved in evaluating the economic value of incremental

improvements in water quality. Efforts have been made to compare the biennial 305(b) water quality assessments in an attempt to determine changes and/or trends in water quality over time. However, this has been unsuccessful due to changes in the evaluation protocols and the lack of a direct correlation between water quality improvements, environmental/natural resource improvements, and the associated economic impacts and valuations of these improvements. Nonetheless, some estimates of the costs and benefits of improvements in water quality and water resources are available.

Rhode Island has received \$284,200,000 in Federal Construction Grants Program funds from the Environmental Protection Agency (EPA) since the inception of the Federal Clean Water Act (P.L. 92-500) in 1972. These federal grant funds along with the \$64,600,000 in state matching grant funds made it possible for all of the wastewater treatment facility and sewer projects noted below to be constructed. The environmental and economic benefits produced by these projects are significant. These projects not only improved the water quality in the shellfish growing areas, but also allowed additional shellfish growing areas to be reopened. These water quality improvements have not only benefited the shellfishing and finfishing industries, which are a combined \$25 million a year industry, but they have also supported the \$2.65 billion a year tourism industry.

Of the total projects constructed with these funds, six projects involved the construction of new treatment facilities and sewer systems that eliminated sewage discharges, resulting in significant water quality improvements. These six facilities are Burrillville, Jamestown, Newport, New Shoreham, Smithfield, and South Kingstown. The Jamestown and South Kingstown projects involved replacement of existing sewerage systems and construction of secondary treatment facilities. The Newport project involved replacement of sewers and separation of combined sewers. These projects have resulted in water quality improvements that have enabled the opening of bathing beach and shellfish growing areas. The other three projects involved new WWTFs and installation of sewers, where there were none previously. The benefits of extending sewer service to previously unsewered areas is difficult to assess as many small untreated (failing ISDS) sources are replaced by one large treated point source. It should be noted that the Burrillville and Smithfield projects involved better than secondary treatment, and that neither of these projects resulted in the significant degradation of water quality in the vicinity of the discharge or impairment of existing uses. The third project (New Shoreham) required that a shellfishing closure, formerly operated on a seasonal basis, be made permanent in the vicinity of the outfall. The construction of this facility and the absence of local control over land use induced growth in the tourist industry which overloads the treatment works during summer months. Following corrective actions in plant operations, a state moratorium on sewer connections was lifted. The Town has instituted a program to review connections on a case-by-case basis. The Town completed a solids handling/dewatering and an additional clarifier project on 28 September 1990, which dramatically improved the plant's ability to remove solids from its effluent and meet its 30/30 permit limitation.

Seven projects involved upgrading an existing primary facility to a secondary treatment plant, as required by the Clean Water Act. These facilities are the Bristol, East

Greenwich, Narragansett-Scarborough Hills, Newport, Warren, Westerly, and Woonsocket facilities. The upgrading of the Westerly facility, coupled with sewerage works construction in Stonington, Connecticut, resulted in the opening of shellfishing areas in Little Narragansett Bay in the late 1980s. (Nonpoint sources of pathogens required this areas to be closed to shellfishing again the 1991). The upgrading of the Woonsocket plant has raised the water quality of the Blackstone River from a Class D to a Class C river, making it consistent with water quality goals. The improvements at the Bristol, East Greenwich, Newport, Warren, and Narragansett plants have improved bathing water quality at nearby beaches, and shellfishing areas were opened in Warren.

Five projects involved sewers only [Barrington, Warwick-Oakland Beach, Middletown, Narragansett (North End), and West Warwick-Natick], specifically, sewerage areas not previously sewered and discharging to an existing WWTF. In Barrington, the entire town was sewered, eliminating many problems with subsurface disposal systems in that high water table area.

Five projects involved upgrading existing secondary WWTFs to larger, more modern facilities. The East Providence WWTF was upgraded to accept the increased flow from the new Barrington sewerage system. The Cranston WWTF was upgraded to a 23 MGD secondary plant. The Narragansett Bay Commission Bucklin Point Facility, formerly the Blackstone Valley District Commission (BVDC), received improvements to the clarification, aeration and solids handling and dewatering systems. The City of Warwick's facility received major improvements to its septage receiving, clarification, aeration, solids digestion and dewatering, and chlorination systems, enabling it to provide advanced treatment during the summer months.

The largest wastewater treatment facility (WWTF) project in the State involved the upgrading of the Narragansett Bay Commission (NBC) Field Point WWTF in Providence. Contract I, the major upgrading of the existing primary and secondary WWTF, was completed on 29 June 1989. This increased NBC's average daily flow to 77 MGD and its peak design flow to 91 MGD. Contract IIA was completed on 21 December 1990 with the complete rehabilitation/improvement of the Ernest Street Pump Station. New headworks and grit removal facilities were provided under Contract IIB, which was completed on 17 January 1992. Studies on the alternatives for permanent solids handling and disposal are currently on-going. The Field's Point Combined Sewer Overflow (CSO) treatment facility was completed on 29 January 1991 under Contract IIC. The completion of these projects has resulted in water quality improvements to the Providence River under dry weather and moderate wet weather conditions. However, the remaining CSO's in NBC's Sewerage System still cause significant water quality degradation in the Providence River and Upper Narragansett Bay following excessive rainfall.

These expenditures have resulted in significant gains in water pollution control as well as improved water quality conditions. Between 1984 and 1994, statewide pollutant loadings from WWTFs have been reduced 76% for BODs and 60% for total suspended solids. A recent report covering 1998 and 1999 reported that 12 WWTFs had no violations of conventional pollutant permit limits, while 4 plants had two or fewer

violations, and only 3 plants had more than three violations

All major municipal wastewater treatment facilities have achieved at least secondary treatment. Currently, the three largest categories of construction needs for further water quality improvements are combined sewer overflows (from the Narragansett Bay Commission's Sewerage Systems); advanced treatment, particularly for the Pawtuxet River communities of Cranston, Warwick, and West Warwick; and nonpoint source implementation projects.

D. SPECIAL STATE CONCERNS AND RECOMMENDATIONS

1. State Concerns

a. Sustainable Watershed Initiative

Rhode Island recognizes the advantage of working on a watershed basis when protecting and managing natural resources. During the past several years, DEM has worked with a number of partners to develop a framework by which the watershed-based approach to resource management can be expanded. DEM is currently working with stakeholders to pilot the watershed approach in two areas: Southern Rhode Island and the Woonasquatucket River watershed. The goal is to engage stakeholders to collaborate and devise action plans that more effectively address watershed concerns. The initiative is being used to promote improved environmental planning and other “smart growth” strategies. The watershed initiative is reflected in many of the following descriptions of state concerns.

b. Monitoring Needs

In 1997, in its assessment of water resource programs, DEM identified gaps in available water quality data as a significant concern. While steps have since been taken to expand monitoring, as this report indicates, the data gaps remain significant: 24% of lake acres and 53% of river miles are unassessed. Additionally, data currently used to support the assessment of surface waters may become outdated in the near future creating additional gaps on selected parameters such as toxics. OWR is committed to developing a revised monitoring strategy that will provide a framework for eliminating significant geographic gaps in data and insuring adequate coverage of parameters of concern. The framework will reflect the partnerships and collaborations that occur among state, local and federal agencies, universities and colleges, other organizations and volunteers regarding monitoring activities. Additional resources will be required to implement a comprehensive monitoring program that meets the needs of water resource managers.

c. Combined Sewer Overflows (CSOs) – Upper Narragansett Bay

The major impairment of use in Narragansett Bay results from bacterial contamination. Clearly, the most significant sources are the combined sewer overflows that discharge in the Providence metropolitan region into the upper bay or its tributaries. Significant portions of the estuary area temporarily closed to shellfishing following rainfall events of one-half inch or more. A previous inventory identified eighty-six CSO outfalls which discharge to the Providence River or its tributaries. These CSOs fall under the auspices of the Narragansett Bay Commission (NBC). The NBC's Wet Weather Facility located at the Fields Point WWTF provides primary treatment for up to 123 MGD of wet weather flow.

NBC has finished a system-wide CSO facilities plan. The recommended initial plan featured three tunnel branches and seven near surface storage facilities at total estimated project cost of \$476 million. NBC established a CSO Stakeholder Group to involve interested parties in evaluating the current CSO program and alternative plans. After months of meetings, the stakeholder process developed a consensus around an alternative plan divided into phases. The group supported implementation of Phase I, which included a main tunnel, two stub tunnels and an upgrade to the Bucklin Point facility. Prior to initiating Phase II and III, the group determined additional evaluations, including water quality monitoring studies, were desirable. The Stakeholder Group will continue to monitor progress on the CSO abatement strategy

NBC has proceeded with a 30% design plan for Phase I, which is now partially approved. In the interim, NBC has also eliminated sixteen CSOs by plugging the discharge pipes. As a result, the number of active CSOs in the NBC system is 70.

d. Watershed Restoration – Developing TMDLs

Restoring the quality of rivers, lakes and coastal waters to support their designated uses has emerged as a state priority. Accomplishing actual restoration remains a significant challenge. The 2000 303(d) list for Rhode Island includes over 120 waterbody listings for a range of impairments. The most common impairments involve nutrients, metals and pathogens. Working within available resources, DEM and its contractors are conducting assessments of impaired waters pursuant to an aggressive schedule. The assessments and corresponding restoration plans, known as Total Daily Maximum Load (TMDLs), provide the technical basis for investing in pollution abatement. The development of TMDLs is done with stakeholder input at all stages. Given the nature of RI's water pollution problems and the significant contributions of nonpoint sources, the restoration plans in most watersheds will be multi-faceted. To support local implementation, DEM is giving priority to TMDL-related projects in the distribution of nonpoint abatement grants. However, it is clear that additional

resources are needed in order to meet the demands of the TMDL mandate. The needs include funding for assessment, local capacity building, local implementation projects and program coordination.

e. Nonpoint Source Pollution – Septic Systems

Nonpoint pollution sources are suspected of being the major contributors in a majority of the impaired water bodies included on Rhode Island's 303(d) list.

Septic systems – either failed or substandard – are recognized as one of the leading NPS problems in the state – contributing nutrients, bacteria and potentially viruses to both coastal and inland waters. Of the estimated 140,000 septic systems in the state, over 70,000 are suspected of being inadequate. Consistent with the Nonpoint Source Pollution Management Plan, a multi-faceted strategy has been pursued to prevent and abate pollution from septic systems. Key components of the strategy include: (1) licensing of ISDS designers and related regulatory reforms, (2) institution of soil-based siting approach, (3) demonstration of innovative and alternative (I & A) technologies and related training, (4) creation of a process to evaluate and approve specific I & A technologies, (5) establishment of local wastewater management programs, (6) providing financial assistance for upgrades of septic systems via the Clean Water Finance Agency (CWFA) and (7) expansion of public education and outreach; e.g. promote proper system maintenance. Fourteen of the 27 communities which rely significantly on septic systems are now developing or implementing local wastewater management programs. Additional grants to support local programs are planned. Continued implementation of program initiatives to encourage the upgrade and replacement of inadequate septic systems will remain a priority.

f. Nonpoint Source Pollution – Stormwater

Untreated stormwater discharges constitute a second major NPS pollution concern in RI. Runoff from a wide range of land uses, e.g. industrial, suburban, agricultural can contribute to water quality degradation. Given the density and pattern of development in the state, strategies to address stormwater management must involve both prevention and abatement; e.g. retrofit programs. With the implementation of Phase II stormwater requirements, DEM expects an increased demand for both technical and financial assistance from local entities. Needs include, among others, improved guidance on BMPs, training, a better understanding of BMP performance and support to build and implement local stormwater programs. Additionally, from the prevention perspective, there is a need to develop the local planning capacity to allow application of innovative land use controls which may have the benefit of reducing runoff. To be most effective, stormwater management strategies should be considered in the context of watersheds. DEM expects the development of TMDLs to continue to provide an important means to identify and prioritize stormwater abatement projects that are needed to accomplish watershed restoration goals.

g. Sediments – Toxics and Dredging

Toxics have been a significant concern historically in Rhode Island waters, particularly in the Upper Bay and urban rivers. However, with the effective implementation of industrial pretreatment at WWTFs, total metal loadings to surface waters from WWTFs have fallen dramatically. For example, the NBC documented a 93% decline in effluent metal loadings between 1981 and 1995. While surface waters have benefited from such improvements, the historical, long-term industrial use of Rhode Island's urban rivers have left a challenge with respect to toxic contamination of sediments. Recent sampling of sediments in the Woonasquatucket River watershed confirmed the presence of dioxin at elevated levels. Subsequently, the EPA expanded its assessment and eventually designated selected areas along the river on the National Priorities List (NPL). Unfortunately, the extent of sediment contamination in all RI urban rivers is not yet fully characterized and it remains a concern warranting future attention.

The presence of toxics in sediments makes the process of locating dredge disposal sites even more challenging. Rhode Island, in collaboration with the ACOE, is planning on undertaking a major dredging project to restore the Providence River shipping channel. Proposed locations are under review. The State does not currently have a designated dredge disposal area, which creates a hardship on facilities that need to perform maintenance dredging. CRMC has been tasked by the legislature to prepare a statewide dredging plan, which would address the routine dredge disposal needs of marinas, etc. Preliminary disposal sites have been identified but additional site characterization is needed. OWR will be involved in all dredging projects to insure that water quality impacts will be minimized.

h. Narragansett Bay – Nutrients and Dissolved Oxygen

Recent monitoring projects have begun to identify impacts of nutrient loadings to the Bay. Studies in the Providence River suggest that long-standing dissolved oxygen problems are linked to the level of nitrogen inputs to the upper estuary. The upper Bay areas are important spawning grounds for a variety of fish and shellfish and these populations may be seriously impacted by even short-term anoxic or hypoxic events. In 1999, DEM, in collaboration with partners, conducted a dissolved oxygen survey, which indicated concerns in the upper bay, Greenwich Bay and upper West Passage. Additional monitoring has been conducted during the summer of 2000. DEM is placing greater emphasis on promoting nutrient reduction through workshops, training sessions and development of other strategies that can be undertaken in the interim to WWTF upgrades. Additional data is needed to support a management strategy that will be protective of water quality parameters and reflect an understanding of the impacts on the health and productivity of Bay organisms as well the economic impacts on commercial and recreational fisheries.

i. Habitat Restoration – Coastal and Inland

Habitat restoration has become increasingly important on the national and local level, especially as studies across the country reveal how much of these resources we have lost or degraded. Here in R.I., we have lost 37% of all coastal wetlands that existed in colonial times (from 102,000 acres to 65,000 acres). Areas of the Bay that were once covered with eelgrass beds, such as Greenwich Bay, now have none. Recent studies conducted by the NBEP with other partners estimate that there are only about 50 acres of eelgrass left in a bay that once had extensive beds. The loss of freshwater wetland habitat is not as well quantified. Both freshwater wetlands and coastal marshes have been impacted from nonpoint source pollution and sedimentation as well as lost to land development. But agencies, organizations, politicians, and citizens are responding to this problem at all levels. Efforts are underway to pass national legislation that will provide federal dollars for estuarine habitat restoration. State agencies are collaborating with a wide range of partners to develop habitat restoration strategies for coastal habitats as well as freshwater wetlands. Mapping and prioritization projects are in various stages of completion for coastal and inland habitats. Nearly 100 specific restoration opportunities have been mapped and in recent years an increased number of projects have been completed. More funding is needed to facilitate habitat restoration and evaluate over time the ecological success of the projects.

j. Low Flow Impacts - Hydromodification/Withdrawals

Low flow characteristics of streams are important elements in the planning and developing of water resources, especially with respect to water supply and wastewater discharge. Planners and managers in Rhode Island are concerned that excessive withdrawals of water from certain streams or adjacent aquifers could severely impact the quantity and quality of stream water available during low flow periods. Two critical flow levels are the aquatic base flow and the 7Q10 flow. The aquatic base flow is a flow at which there is adequate water in the stream to sustain a healthy aquatic habitat. The 7Q10 flow is the flow that is used to evaluate pollutant concentrations in relation to developing wastewater discharge permit limits. Information on flow levels of streams is readily available at locations where streamflow data have been systematically collected for a number of years by the U.S.G.S. However, there are only approximately 16 gaging stations currently operating in Rhode Island. Additional information will need to be collected to fully characterize low flow concerns.

Rhode Island does not have a water withdrawal permitting system to regulate water withdrawals. Conditions may be placed on new projects involving withdrawals as a result of applying state wetlands or water quality regulations. Impacts to the aquatic habitat occur due to loss of riverbed area covered by water, inadequate instream water depth for a healthy, reproducing natural fish population and increased pollutant concentrations downstream of dischargers, where discharge limits based on previous 7Q10 flows, may no longer be valid.

The concern about low flows has been identified as a priority in the Pawcatuck River basin due to a heavy demand for irrigation withdrawals for both agriculture and golf courses. A subcommittee of the Wood-Pawcatuck Watershed Initiative has been meeting regularly to develop a voluntary approach to address water withdrawal concerns. As a result, a multi-year study is underway to assess the impacts on aquatic habitat due to water withdrawals in the Usquepaug watershed. When completed, the study should provide a stronger technical basis from which the voluntary management plan can be developed.

k. Constraints on Funding Municipal Pollution Abatement Needs

The special concerns identified above coupled with the expanding eligibilities of the State Revolving Fund (SRF) program will place a greater need for an increase in the amount of SRF monies allotted to the State. The Annual Project Priority Lists regularly show water pollution abatement needs totaling over \$500 million. For example, the 1998 Needs Survey reported a documented total of \$1.2 billion in wastewater needs for Rhode Island. Not included in this total was an estimate of nonpoint pollution abatement needs, including extensive stormwater retrofitting. Although such an estimate of needs is forthcoming, at this time it is reasonable to conclude that this figure will add significantly to the total contained in the Needs Survey. Presently, SRF capitalization grants to Rhode Island are averaging only around \$10 million per year.

In addition to the SRF, grants have served as important financial incentives for both water quality and habitat restoration projects. The state also needs to provide assistance to address municipal needs with respect to the implementation of programs at the local level. Key areas of need include stormwater management, on-site wastewater management, land use planning and habitat restoration. The state needs to continue to support a range of financial incentives in order to be successful.

2. Recommendations

The following list of recommendations outlines general action that are deemed necessary to achieve the objectives of the CWA in Rhode Island waters.

a. The State Revolving Fund (SRF) has successfully become the major source of funding for municipal wastewater treatment and sewerage projects in Rhode Island. The State's 1998 Needs Survey identified 41.2 billion in wastewater construction over the next twenty years. This significantly exceeds the funds available through the SRF including leveraging. In order to meet these projected needs, greater funding of the SRF is necessary.

b. The cost of Combined Sewer Overflow mitigation represents a major

portion of the future wastewater needs. Special funding, dedicated to CSOs, is needed to supplement annual SRF appropriations to facilitate the implementation of CSO abatement. These special funds should be administered through the SRF program to take advantage of the leveraging abilities of the SRF program.

c. Municipalities should continue to receive direction and assistance in achieving adequate levels of Operations and Maintenance to maintain the POTWs constructed under the Clean Water Act (CWA).

d. Growth management strategies are needed to avoid exceeding sewerage system capacities in communities subject to development pressures.

e. Expansion of water quality monitoring to provide data for assessment of water quality of surface waters (both fresh and salt waters), including nutrients, metals, dissolved oxygen, etc. needs to be continued. Inadequate funding available for baseline monitoring continues to be an obstacle.

f. Waters which fail to support designated uses should be further evaluated and restored through the development of TMDLs. Financial assistance for pollution abatement, including BMPs to abate nonpoint sources, should be renewed and targeted to support watershed restoration.

g. DEM and its partners should continue to pursue implementation of watershed-based approaches to resource protection and restoration. The coordinating council should continue to identify and address issues related to implementing the Sustainable Watershed Initiative including building support to fund and expand this activity.

h. DEM should continue to review and approve innovative and alternative technologies for on-site wastewater disposal and develop a more systematic means to track their performance.

i. A Statewide policy to provide for safe and sanitary disposal of septage must be adopted.

j. All communities which rely significantly on septic systems should develop a local wastewater management program which provides technical or financial assistance and oversight as appropriate to address system maintenance, repair, and replacement needs in the community.

k. A statewide comprehensive stormwater management strategy needs to be developed to insure the adequate control and treatment of runoff from both new and existing land uses. The strategy should address coordination of stormwater-related permitting and address the financial and technical assistance needs of local entities.

l. State support of growth management and nonpoint source pollution

control efforts is necessary to prevent further water quality degradation to surface and ground water resources from stormwater runoff, septic systems, and other diffuse sources of pollution associated with development. Resources are needed to provide incentives for communities to build capacity to implement local programs that take advantage of innovative land use controls among other strategies.

m. Statewide policy/guidance is needed in the areas of water conservation and water use (water withdrawals and out-of-basin transfers in relation to water/habitat quality).

n. The EPA should continue to foster "pollution prevention" and "source reduction" programs. The EPA should work with industrial trade groups to publicize "success stories" and develop implementation strategies.

o. EPA, DEM and others should work together to promote compliance with the no discharge designation granted for Rhode Island coastal waters.

p. Implementation of the state groundwater protection strategy should be continued with an emphasis on providing assistance to foster local protection programs and continued policy development to assure consistency and effectiveness among state regulations.

q. State and local governments must work cooperatively via the Wellhead Protection Program and Source Water Assessment Program to effectively prevent the degradation of groundwater resources that support drinking water supply uses. State capabilities to provide technical and financial assistance should be expanded to meet the needs of local governments and water suppliers.

r. Additional assessment is needed to determine the extent of nitrate contamination in groundwater throughout Rhode Island. Where elevated nitrogen concentrations have been detected in areas of active agriculture, additional research is needed to identify or refine the best management practices needed to reduce pollutant loading.

s. Discharges that pose a high risk for adversely affecting groundwater quality should continue to be eliminated under the closure procedures administered by the Underground Injection Control (UIC) Program. Best management practices should be encouraged at facilities to minimize pollution risks.

t. DEM should continue to pursue improvement to data management systems to allow more effective use of data and information and improve public access to such information. Linking databases via a common geographic identifier should continue to be pursued.

u. Rhode Island should develop a statewide strategy to protect and restore wetland resources. The framework would reflect both regulatory and non-regulatory activities with recommendations on improving protection or restoration.

v. DEM should continue to work with partners to secure a reliable source of funding to support habitat restoration projects. State and local funds should be used to leverage federal funds that are or may become available for such purposes.